Search and Detection
Discrete Search and Expanding Area Search

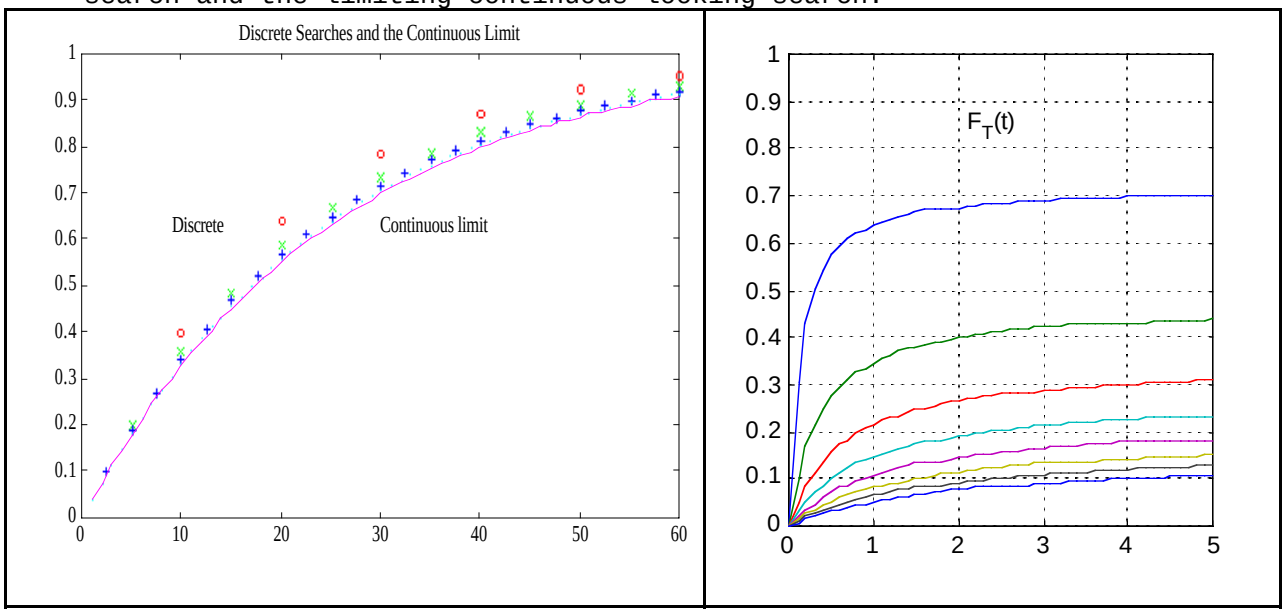
1. Consider 4 discrete searches:

i. Glimpses occur at times (in minutes) 10, 20, 30 ... with each g_i = .4.
ii. Glimpses occur at times (in minutes) 5, 10, 15 ... with each g_i = .2.
iii. Glimpses occur at times (in minutes) 2.5, 5, 7.5 ... with each g_i=.1.
iv. Glimpses occur at times (in minutes) 1, 2, 3 ... with each g_i = .04.

a. What is the mean time to detection (E[T]) for each search assuming that the searches have an infinite duration?

b. These discrete searches have a limiting continuous-looking search. What is the CDF for the time of initial detection ($F_T(t)$) for this limiting, continuous-looking search?

c. For t between 0 and 60 minutes, show on one plot $F_T(t)$ for each discrete search and the limiting continuous-looking search.



2. Consider an expanding area random search with u=20 kt, v=200 kt, and R=1 nm.

a. For times late τ=.25:.25:2 hr, use MATLAB to calculate and plot $F_T(t)$ = P{initial detection time T≤t} for t=0:.1:5 hr.
b. For τ=.1:.1:4 hr, use MATLAB to calculate and plot maxP_d.
c. Show that the mean time to detection given detection occurs is infinite. Hint: Show that the integral from 0 to infinity of either $(t/\max P_d)*f_T(t)$ or $(1 - F_T(t)/\max P_d)$ is infinite.